



## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2021-1183; Project Identifier AD-2021-01193-E; Amendment 39-22029; AD 2022-09-09]**

**RIN 2120-AA64**

#### **Airworthiness Directives; CFM International, S.A. Turbofan Engines**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for all CFM International, S.A. (CFM) LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26CJ, LEAP-1A26E1, LEAP-1A29, LEAP-1A29CJ, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, and LEAP-1A35A model turbofan engines. This AD was prompted by the detection of melt-related freckles in the billet, which may reduce the life of certain compressor rotor stages 6-10 spools, high pressure turbine (HPT) rotor interstage seals, HPT rotor stage 2 disks, low pressure turbine (LPT) stage 1 disks, LPT stage 2 disks, LPT stage 3 disks, and LPT stage 4 disks. This AD requires revising the airworthiness limitations section (ALS) of the applicable CFM LEAP-1A Engine Shop Manual (ESM) and the operator's existing approved continuous airworthiness maintenance program (CAMP) to incorporate reduced life limits for these parts. This AD also requires the removal of certain LPT stage 4 disks identified by serial number (S/N) prior to their new life limits. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** For service information identified in this final rule, contact CFM International, S.A., Aviation Operations Center, 1 Neumann Way, M/D Room 285, Cincinnati, OH 45125; phone: (877) 432-3272; email: [fleetsupport@ge.com](mailto:fleetsupport@ge.com). You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-1183.

### **Examining the AD Docket**

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-1183; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Mehdi Lamnyi, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7743; fax: (781) 238-7199; email: [Mehdi.Lamnyi@faa.gov](mailto:Mehdi.Lamnyi@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Background**

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to all CFM LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26CJ, LEAP-1A26E1, LEAP-1A29, LEAP-1A29CJ, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, and LEAP-1A35A model turbofan engines. The NPRM published in the *Federal Register* on January 18, 2022 (87 FR 2563). The NPRM was prompted by the manufacturer's detection of melt-related freckles in the billet, which may reduce the life of certain compressor rotor stages 6-10 spools, HPT rotor interstage seals, HPT rotor stage 2 disks, LPT stage 1 disks, LPT stage 2 disks, LPT stage 3 disks, and LPT stage 4 disks (life-limited parts (LLPs)). Through the manufacturer's investigation, it was determined that these LLPs may have subsurface

anomalies that developed during the manufacturing process, resulting in a lower life capability. In the NPRM, the FAA proposed to require revising the ALS of the CFM LEAP-1A ESM, as applicable to each affected engine model, and the operator's existing approved CAMP to incorporate reduced life limits for certain LLPs. In the NPRM, the FAA also proposed to require operators to remove certain LPT stage 4 disks, identified by S/N, before reaching their new life limits. The LPT stage 4 disks, identified by S/N in Figure 1 to paragraph (g)(2) of the NPRM, were discovered by the manufacturer after publication of the ALS revision.

After the NPRM was issued, CFM revised its service information by including additional part numbers for newly manufactured parts that did not exist prior to NPRM publication. Accordingly, the FAA has revised paragraph (g)(1)(iii) of this AD to require operators to update the ALS of the applicable CFM LEAP-1A ESM and the operator's existing approved CAMP to include CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 010-00, dated February 15, 2022, instead of CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 009-00, dated June 1, 2021.

The FAA has also added a credit for previous actions paragraph to this AD, providing credit to operators that incorporated CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 009-00, dated June 1, 2021, into the ALS of the applicable ESM and the operator's existing approved CAMP prior to the effective date of this AD.

The FAA is issuing this AD to address the unsafe condition on these products.

#### **Discussion of Final Airworthiness Directive**

##### **Comments**

The FAA received comments from two commenters. The commenters were American Airlines (AA) and Air Line Pilot Association, International (ALPA). The following presents the comments received on the NPRM and the FAA's response to each comment.

##### **Request to Include Future Revisions to ESM**

AA requested that the FAA add "... or later" to the following ALS references in

paragraph (g) of this AD to allow for the use of future revisions;

(i) CFM High Pressure Compressor Rotor Life Limits LEAP 1A-05-11-02-01A-0B1B-C, Issue 010-00, dated September 15, 2021, or later;

(ii) CFM High Pressure Turbine Rotor Life Limits LEAP 1A-05-11-03-01A-0B1B-C, Issue 007-00, dated September 15, 2021, or later; and

(iii) CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 009-00, dated June 1, 2021, or later.

AA stated that they are currently using Issues 7, 9, and 10 of the referenced service information and their ALS and CAMP are already in compliance with this AD. AA also stated that CFM continues to update the referenced service information and Issues 7, 9, and 10 will be further revised. As a result, the requirements of this AD will cause AA to use outdated service information.

The FAA disagrees with adding “or later” when referencing the service information in paragraph (g) of this AD. Future revisions of the service information have not yet been published by the manufacturer or reviewed by the FAA. A request for an alternative method of compliance can be submitted to the FAA if future revisions of the service information referenced in paragraph (g) of this AD are published. Additionally, if future revisions of the service information are published by the manufacturer and approved by the FAA, the FAA may consider further rulemaking.

#### **Request to Add Credit for Previous Actions**

AA requested that the FAA add a new paragraph (h)(3) to this AD to allow credit for previous actions associated with the required actions proposed in paragraph (g)(1)(iii) of the NPRM, similar to the credit paragraphs proposed in (h)(1) and (h)(2) of the NPRM. AA requested that the new paragraph (h)(3) provide credit to operators if CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 008-00 was incorporated into the ALS of the applicable ESM and the operator’s existing approved CAMP prior to the effective date of this AD.

The FAA notes that CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 009-00, dated June 1, 2021, was the first issue of this service information to include the reduced life limits for that module as a result of the

investigation into melt-related freckles in the billet. Issue 008-00 and earlier issues do not include the reduced life limits so the FAA will not provide credit for issues released prior to Issue 009-00. Since the FAA issued the NPRM, the manufacturer published CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 010-00, dated February 15, 2022. As a result, the FAA has added paragraph (h)(3) to this AD, providing credit for actions required by paragraph (g)(1)(iii) of this AD if CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 009-00, dated June 1, 2021, was incorporated into the ALS of the applicable ESM and the operator's existing approved CAMP prior to the effective date of this AD.

### **Support for the AD**

ALPA expressed support for the AD as written.

### **Conclusion**

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes and any other changes described previously, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

### **Related Service Information under 1 CFR Part 51**

The FAA reviewed CFM High Pressure Compressor Rotor Life Limits LEAP 1A-05-11-02-01A-0B1B-C, Issue 010-00, dated September 15, 2021 (CFM LEAP 1A-05-11-02-01A-0B1B-C); CFM High Pressure Turbine Rotor Life Limits LEAP 1A-05-11-03-01A-0B1B-C, Issue 007-00, dated September 15, 2021 (CFM LEAP 1A-05-11-03-01A-0B1B-C); and CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 010-00, dated February 15, 2022 (CFM LEAP 1A-05-11-04-01A-0B1B-C). CFM LEAP 1A-05-11-02-01A-0B1B-C provides the new life limits for the high-pressure compressor, CFM LEAP 1A-05-11-03-01A-0B1B-C provides the new life limits for the HPT rotor, and CFM LEAP 1A-05-11-04-01A-0B1B-C provides the new life limits for the LPT rotor. This service information is reasonably available because the

interested parties have access to it through their normal course of business or by the means identified in ADDRESSES.

#### **Other Related Service Information**

The FAA reviewed CFM LEAP 1A-05-11-02-01A-0B1B-C, Issue 009-00, dated July 26, 2021; CFM LEAP 1A-05-11-03-01A-0B1B-C, Issue 006-00, dated July 26, 2021, and CFM LEAP 1A-05-11-04-01A-0B1B-C, Issue 009, dated June 1, 2021. This service information provides the new life limits for the LLPs.

The FAA also reviewed CFM Service Bulletin (SB) LEAP-1A-72-00-0413-01A-930A-D, Issue 004-00, dated December 11, 2021 (CFM SB LEAP-1A-72-00-0413-01A-930A-D). CFM SB LEAP-1A-72-00-0413-01A-930A-D specifies procedures for removing and replacing the LLPs, and provides new life limits for certain S/Ns of the LLPs.

#### **Costs of Compliance**

The FAA estimates that this AD affects 256 engines installed on airplanes of U.S. registry. The FAA estimates that 256 engines installed on airplanes of U.S. registry require revising the ALS of the CFM LEAP-1A ESM and the operator's existing approved CAMP. The FAA estimates that zero airplanes of U.S. registry require replacement of the LPT stage 4 disk.

The FAA estimates the following costs to comply with this AD:

##### **Estimated costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
Revise ALS of Engine Manual and the operator's existing approved CAMP	1 work-hour x \$85 per hour = \$85	\$0	\$85	\$21,760

The FAA estimates the following costs to replace the LPT stage 4 disk:

##### **Estimated costs**

Action	Labor Cost	Parts Cost	Cost per product	Cost on U.S. operators
Replace LPT Stage 4 disk	225 work-hours x \$85 per hour = \$19,125	\$129,000	\$148,125	\$0

### **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA’s authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency’s authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

### **Regulatory Findings**

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

### **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

### **The Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

## **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

**2022-09-09 CFM International, S.A.:** Amendment 39-22029; Docket No. FAA-2021-1183; Project Identifier AD-2021-01193-E.

#### **(a) Effective Date**

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

#### **(b) Affected ADs**

None.

#### **(c) Applicability**

This AD applies to CFM International, S.A. (CFM) LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26CJ, LEAP-1A26E1, LEAP-1A29, LEAP-1A29CJ, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, and LEAP-1A35A model turbofan engines.

#### **(d) Subject**

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compressor Section, and JASC Code 7250, Turbine Section.

#### **(e) Unsafe Condition**

This AD was prompted by the detection of melt-related freckles in the billet, which may reduce the life of certain compressor rotor stages 6-10 spools, high pressure turbine (HPT) rotor interstage seals, HPT rotor stage 2 disks, low pressure turbine (LPT) stage 1 disks, LPT stage 2 disks, LPT stage 3 disks, and LPT stage 4 disks. The FAA is issuing this AD to prevent the failure of the high-pressure compressor, HPT rotor, and LPT rotor. The unsafe condition, if not addressed, could result in release of uncontained debris, damage to the engine, and damage to the airplane.

#### **(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.



### **(g) Required Actions**

(1) Within 60 days after the effective date of this AD, revise the airworthiness limitations section (ALS) of the applicable CFM LEAP-1A Engine Shop Manual (the ESM) and the operator's existing approved continuous airworthiness maintenance program (CAMP) by incorporating the following service information:

(i) CFM High Pressure Compressor Rotor Life Limits LEAP 1A-05-11-02-01A-0B1B-C, Issue 010-00, dated September 15, 2021; and

(ii) CFM High Pressure Turbine Rotor Life Limits LEAP 1A-05-11-03-01A-0B1B-C, Issue 007-00, dated September 15, 2021; and

(iii) CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 010-00, dated February 15, 2022.

(2) Before the LPT stage 4 disk, part number (P/N) 362-039-520-0, with serial numbers identified in Figure 1 to paragraph (g)(2) of this AD (Figure 1) accumulates the cycles in Figure 1, or within 100 cycles after the effective date of this AD, whichever occurs later, remove the affected LPT stage 4 disk from service and replace with a part eligible for installation.

**Figure 1 to Paragraph (g)(2) – Life Limits for LPT Stage 4 Disks, P/N 362-039-520-0**

<b>LPT Stage 4 Disk Serial Number</b>	<b>Life Limit for LEAP-1A23, - 1A24, -1A24E1, -1A26, - 1A26E1, -1A29, -1A30, -1A32, - 1A33, -1A33B2, and -1A35A</b>	<b>Life Limit for LEAP-1A26CJ and -1A29CJ</b>
PC975638	2,500 cycles	1,400 cycles
PC975635		

### **(h) Credit for Previous Actions**

(1) You may take credit for the action required by paragraph (g)(1)(i) of this AD if the following service information was incorporated into the ALS of the applicable ESM and the operator's existing approved CAMP prior to the effective date of this AD: CFM High Pressure Compressor Rotor Life Limits LEAP 1A-05-11-02-01A-0B1B-C, Issue 009-00, dated July 26, 2021.

(2) You may take credit for the action required by paragraph (g)(1)(ii) of this AD if the following service information was incorporated into the ALS of the applicable ESM and the operator's existing approved CAMP prior to the effective date of this AD: CFM High Pressure Turbine Rotor Life Limits LEAP 1A-05-11-03-01A-0B1B-C, Issue 006-00, dated July 26, 2021.

(3) You may take credit for the action required by paragraph (g)(1)(iii) of this AD if the following service information was incorporated into the ALS of the applicable ESM and the operator's existing approved CAMP prior to the effective date of this AD: CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 009-00, dated June 1, 2021.

**(i) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (j) of this AD. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

**(j) Related Information**

For more information about this AD, contact Mehdi Lamnyi, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7743; fax: (781) 238-7199; email: Mehdi.Lamnyi@faa.gov.

**(k) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) CFM High Pressure Compressor Rotor Life Limits LEAP 1A-05-11-02-01A-0B1B-C, Issue 010-00, dated September 15, 2021.

(ii) CFM High Pressure Turbine Rotor Life Limits LEAP 1A-05-11-03-01A-0B1B-C, Issue 007-00, dated September 15, 2021.

(iii) CFM Low Pressure Turbine Rotor Life Limits LEAP 1A-05-11-04-01A-0B1B-C, Issue 010-00, dated February 15, 2022.

(3) For service information identified in this AD, contact CFM International, S.A., Aviation Operations Center, 1 Neumann Way, M/D Room 285, Cincinnati, OH 45125; phone: (877) 432-3272; email: [fleetsupport@ge.com](mailto:fleetsupport@ge.com).

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov), or go to: <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued on April 15, 2022.

Lance T. Gant, Director,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

[FR Doc. 2022-10447 Filed: 5/13/2022 8:45 am; Publication Date: 5/16/2022]